PATENT SPECIFICATION (11) 1 303 615

1303615

DRAWINGS ATTACHED

(21) Application No. 10300/71 (22) Filed 20 April 1971

(31) Convention Application No. 46600 (32) Filed 1 June 1970 in

(33) Japan (JA)

(44) Complete Specification published 17 Jan. 1973

(51) International Classification B60K 1/00

(52) Index at acceptance

B7H A2D A6D C16C C16G1 C8X P1 P5 P7D1 V2A

(19)

(54) AN ELECTRICALLY PROPELLED CAR

(71) We, NISSAN MOTOR COMPANY, LIMITED, a corporation organized under the laws of Japan, of No. 2, Takaramachi, Kanagawa-ku, Yokohama City, Japan, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to electrically propelled cars and more particularly to an improved drive system for use in the electrically propelled cars.

Known electrically propelled cars are similar to gasoline-powered automobiles in that the prime mover is disposed within the forward bonnet and connected to the rear axles through the propeller shaft and differential gears provided rearwardly of the vehicle. Such an arrangement of the drive system has been found uneconomical, and for larger-size electrically propelled cars it has been proposed to provide motors for respective driving axles. In the case of smaller-size electrically propelled cars however, the provision of motors directly for respective driving axles such as right and left rear axles is unsuitable not only from an economical point of view but also in view of the space limitations.

According to this invention there is provided an electrically propelled car having a chassis and a body and comprising an electric motor providing motive power for the electrically propelled car and housed in a first casing, reduction gearing and differential gears housed in a second casing integral with the first casing, the thus formed integral unit being mounted by resilient means on the chassis in the rear end of the electrically propelled car, a pair of axles adapted to be driven from the electric motor through the reduction gearing and the differential gears, the axles extending from the integral unit in opposite directions supported by suspension elements and adopted to drive rear wheels and the integral unit having its longitudinal axis in a vertical plane including the center line of the electrically propelled car perpendicular to the axes of the axles.

In the accompanying drawings:

Fig. 1 is a schematic side view showing the entire construction of an electrically propelled car according to this invention;

Fig. 2 is a plan view of the drive system and storage batteries incorporated in the electrically propelled car of Fig. 1;

Fig. 3 is a plan view similar to Fig. 2 and showing a modified form of the drive system;

Fig. 4 is a cross-sectional view of the reduction gearing taken along line IV—IV of Fig. 2; and

Fig. 5 is a cross-sectional view taken along line V—V of Fig. 4.

Referring to Figs. 1 and 2, there is shown an electrically propelled car of a small size. The vehicle has a first casing 11 for an electric motor and a second casing 12 for reduction gearing including differential gears which will be described later. The second casing 12 is disposed rearwardly of the first casing 11 and axially aligned therewith. These two casings 11 and 12 are located in the rear of the vehicle, and formed integrally with each other. Forwardly of the motor casing 11 and below seats 13 and 14, there are provided storage batteries 15 and 16 for supplying power to the motor in the first casing 11. A pair of aligned rear axles 17 and 18 extend from the reduction gear casing 12 transversely of the vehicle and are connected to respective driven rear wheels 19 and 20, each of which supports the chassis 21 of the vehicle by means of suspension elements 22 and 23. While, in this embodiment, the motor casing 11 is shown to be disposed forwardly of the reduction gear casing 12, the motor casing 11 could be disposed rearwardly of the reduction gear casing 12, as shown in Fig. 3. The motor casing 11 is resiliently mounted on the vehicle chassis 21 by any suitable means (not shown). A pair of front wheels 24 and 25 are operatively associated with a steering wheel 26 for steering the vehicle.

Turning to Fig. 4, the output shaft 30 of

[Price 25p]

the motor is splined to a main shaft 31 which extends into the reduction gear casing 12. A pinion 32 secured to the main shaft 31 at one end thereof drivingly meshes a gear 33 secured to an auxiliary shaft 34. A small bevel gear 35 is secured to the auxiliary shaft 34 at one end thereof and engages a large bevel gear 36, which is adapted to drive differential gears 37 of the known type as shown in Fig. 5. The pair of rear axles 17 and 18 extend in opposite directions from the differential gears 37. Thus, the casings 11 and 12 for the motor and reduction gearing is disposed so that the longitudinal axes thereof lie in a vertical plane perpendicular to the aligned axes of the rear axles 17 and 18 and containing the center line of the vehicle body 21.

In operation, the driving power is transmitted through the output shaft 30 and the main shaft 31 to the pinion 32, causing the gear 33 to rotate. At the drive connection between the pinion 32 and the gear 33 a first-stage speed reduction is obtained. Rotation of the gear 33 causes rotation of the small bevel gear 35 and corresponding rotation of the large bevel gear 36, resulting in a second-stage speed reduction at the drive connection between the bevel gears 35 and 36. The driving power is further transmitted through the differential gears 37 to the rear axles 17 and 18, causing the rear wheels 19 and 20 to rotate.

It will thus be noted that the integrally formed motor casing 11 and reduction gear casing 12 eliminate the need to provide a propeller shaft and generally economize the space. This in turn leads to greater spaces available for the batteries 15 and 16 and trunk. Also, the vibrations of the motor are prevented from being transmitted to the vehicle body 21 because the entire drive system from the motor to the wheels is formed as a unitary assembly and mounted on the vehicle chassis 21 by any suitable resilient means (not shown). Furthermore, the provision reduction gears makes possible the use of an electric motor having an output shaft adapted to high revolving speeds. Moreover, the differential gears included in the reduction gearing enable a pair of wheels to be driven from a single motor.

WHAT WE CLAIM IS:—

1. An electrically propelled car having a chassis and a body and comprising an electric motor providing motive power for said electrically propelled car and housed in a first casing, reduction gearing and differential gears housed in a second casing integral with said first casing, the thus formed integral unit being mounted by resilient means in the rear end of said electrically propelled car, a pair of axles adapted to be driven from said electric motor through said reduction gearing and said differential gears, said axles extending from said integral unit in opposite directions supported by suspension elements and adapted to drive rear wheels and said integral unit having its longitudinal axis in a vertical plane including the center line of said electrically propelled car perpendicular to the axes of said axles.

2. An electrically propelled car as claimed in Claim 1, in which said first casing is disposed forwardly of said second casing.

3. An electrically propelled car as claimed in Claim 1, in which said first casing is disposed rearwardly of said second casing.

4. An electrically propelled car substantially as hereinbefore described with reference to and as illustrated in Figs. 1, 2, 4 and 5 or Figs. 1, 2, 4 and 5 as modified by Fig. 3.

MARKS & CLERK,
Chartered Patent Agents,
57 & 58 Lincoln's Inn Fields,
London, WC2A 3LS,
Agents for the Applicants.

Printed for Her Majesty's Stationery Office by the Courier Press, Leamington Spa, 1973.
Published by the Patent Office, 25 Southampton Buildings, London, WC2A 1AY, from which copies may be obtained.

1303615 COMPLETE SPECIFICATION
1 SHEET This drawing is a reproduction of the Original on a reduced scale

Fig. 1

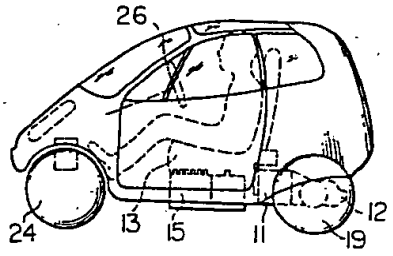


Fig. 2

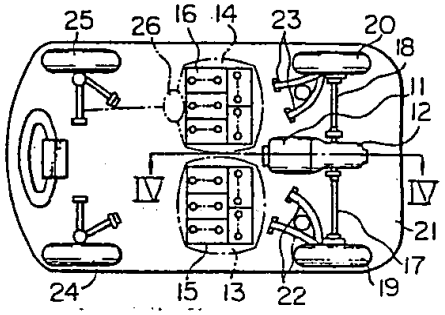
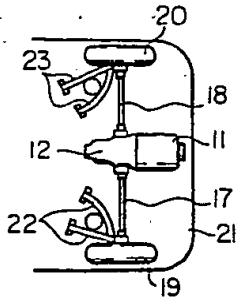


Fig. 4

Fig. 3



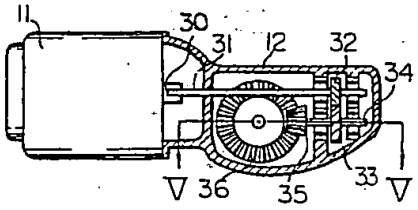


Fig. 5